Plaster-In-Wall Loudspeakers

Concealed Audio Solutions with inspirational results

When installing Amina In Wall Speakers into new situations, there are often many questions that arise during the installation for which you will need to be prepared. To ascertain a great install, we want to provide you with all the right tool-tips and knowledge to install our product properly, and not ever have to go back.

Originally this article was written for one of our dealers in CA, and he said is was well worth the time it took to read, as it raised his confidence level for his first install as if he had done it a thousand times before. I hope you will feel the same. I know it is quite descriptive, but I think worth the time to read it.

The way one installs our speakers might be a bit more work than others, but in most cases what seems to be that little bit of extra work turns out to be a true time and money saver in the end. If you want a perfectly flat surface, specifically if you are going to project onto the surface, you can do it one of two-ways. The first way is described below. It is quite a detailed and long description, and compliments the Installation Video available from our website. Alternatively, contract a good master plasterer or level 1 or 2 drywall repair tech to do the complete wall surface perfect!

Our own demo-room uses the wall as a projection surface, and therefore has to be completely flat. The speakers are not detectable even when you put a straightedge on the wall, nor when you run your hands across the surface to feel for differences. Even at full blast the movement is undetectable to the eye. If you want to find out where they are, run some music or listen to the change in the sound of the wall as you tap or move your hand over the speaker versus the remainder of the drywall. Once your finishing plasterer can put them in like that, you'll totally amaze your clients.

First of all, as in any other speaker installation, make certain you are well prepared, know your technology, ascertain that your acoustical environment and speaker placement is appropriate for your client's lifestyle, living pattern and musical requirements, and that the final SPL levels obtainable will indeed meet or exceed their needs. Once the speaker is situated, it's hard to make a change! So once the selection of product has been made, the design is approved and the install begins, each step of the installation procedure becomes a vital part of the product's final performance capabilities.

When testing for vibrational interference I like to test using a sweeptone, as well as other musical and spoken material (such as can be found on test CDs), but usually you will hear immediately when something is wrong or starts to sing along! If ever there is anything worse than bad quality speakers, it would be sympathetic vibrations. The sound-designer's "Achilles heel" (that and ground-loops). Hence our insistence on doing a job properly right from the start. Here is to a great install. And as always, we're only a call away if you need us!

Good luck!

Your Amina Installation Support team

1. The first step

Cut the hole (normally centered between studs) 14"W x 18", using the fastest and cleanest cut-out method we know off, a Stanley-style blade and a straight-edge. The use of roto-tools never provide as clean and accurate a cut, and leave a lot of damage. Pull into position, and fasten appropriate gauge speaker wire in-place, and make sure there is nothing in the cavity that can vibrate. Try to have the cut-out evenly spaced between the studs, so the speaker does not touch the studs on either side. If there is rough edging, or you feel that there might be some gypsum that is brittle, just take some wet drywall-compound on your fingers and smear it along the edge, sort of "gluing" anything that might be loose to each other. Make certain that the drywall cut is clean and remove any debris or loose material, even loose paper backing that might look like it could cause a problem. " an ounce of prevention keeps your customer happy, and you employed".

2. Use of Sound Insulation

Since the width of the hole is almost as wide as the studs and 18" high, you now have easy access into the wall or ceiling cavity. Stuff sound insulation in the wall, floor to ceiling, or in the ceiling cavity, and use as much as needed to stop the void from becoming a resonant "bass-trap", killing as much sound as possible into adjoining spaces. Put in some extra drywall screws in the area adjacent to the speakers to make sure that the studs and drywall are tight to each other, and the wall or ceiling will not be popping screws. Often our installers use some batten or fibreglass regardless of whether a backbox is used or not, just to dampen both the cavity, and keep dirt from falling on the box or speakerpanel. Laying a thin layer between the speaker-cable and the panel, especially in ceiling applications. also helps to keep any connector cables away from the frame of the speaker, avoiding a possible cause for unwanted sounds.

3. Installation using Blocks

When installing the speakers in a cavity where no sound attenuation or back-box is required, you shall be using the supplied synthetic blocks. Hold the blocks in position with one hand behind the drywall, with the appropriate side facing towards the speaker (blocks are reversible for 1/2" or 5/8"application, and have a specific depth adjustment). With only the rubber mounting area showing, overlapping the corner and as close to the studs as possible, fasten with several drywall screws (2 minimal), making certain the blocks are flat and tight to the back of the drywall, with the screws sturdy and recessed without crunching the drywall. SAFETY NOTE: make sure you do not hold the block where the screws may protrude through the back, as you will not like the feeling of having your fingers screwed to the wall!

4. Installation using FS Aluminum or FS-S Steel Backbox

Specific Back-boxes are available for installations requiring sound attenuation or fireproof applications required by-law or code, like a plenum ceiling or wall, apartment buildings, adjacent rooms, ceilings, etc. Remove the product from the packaging, and locate 4 strips of aluminum spacers in the cavity. When using 5/8" drywall, set the aluminum spacers aside for later use. In ½" drywall applications the spacers can be discarded. You shall also not need the white synthetic blocks supplied with the speaker, unless you wish to use them for extra grip within the backbox. They can be used as extra support for the screws to bite into by placing them within the back-box interior's upper and lower mounting area, and hold them in place as you fasten the back-box to the back of the drywall.

The back box is made to fit in-between 16" centered studs, using ½" or 5/8th thick drywall, and mount into a precut 14" x 18" cavity by sliding it into the cavity (which should have some insulation in it to further deaden the cavity) and locate and fasten it without it touching the studs.

To start this procedure, bend the 2 locator tabs in the center of each lip upwards, and puncture a hole into the grommet (fire-gland) through which you feed the speaker wire. Make certain that the rubber sound blanket remains tight in position during this procedure, and do not make the hole in both the grommet (gland) and sound-blanket larger than the speaker wire you are going to feed through. Only a sealed, tight fit will provide the maximum sound absorption the back box was designed to provide.

Slip the top of the back box through the cavity, moving it up beyond the final location so the bottom can fit through the hole, and pull the box back down to the point where both locator tabs are centered in the cut-out, the mounting area is behind the drywall, and the sides of the box are in-line with the sides of the wall opening, so the speaker may be installed without obtrusions onto the gasket.

Use eight x 1-inch drywall screws, preferably fine-threat used for steel studs, and screw both the top and bottom flange tight through the drywall, making sure the box surface is tight and even to the drywall, and no debris or paper can interfere with the mounting flange and rubber seal. Make sure to use at least 4 drywall screws per flange, 2 left and 2 right of the popup locator

lip. Further secure the drywall to the studs with some extra screws, up to 6" above and below the cut-out, just to make certain that there is no chance of the stud and drywall resonating. Next dry-fit the speaker, making certain it fits without jamming or rubbing against the edges.

IMPORTANT!!

If you are using ½ inch drywall, discard the four 1/8th thick aluminum spacer strips that came with the back-box. If you are using 5/8th drywall, remove the backing of the spacer strips, install these on the back of the speaker panel, making sure that the four screw holes in the panel are not obstructed.

5. DUAL GYPROCK INSTALLS

If the speaker panel is to be installed in dual drywall walls or ceilings, we suggest that each gyprock sheet is cut individually. The inside layer of drywall is cut back to loosely fit the backbox , and the second exterior layer smaller to fit the speakerpanel. This way the backbox still mounts to the top layer of drywall as if it were a single layer installation. The synthetic block could be used to secure the two layers of drywall together in the area around the backbox between the joists or studs. Alternatively, a piece of wood just an inch or two up and down from the backbox or speaker location will suffice as well. This is done using longer screws, and placing the block on the interior of the wall/ceiling where the two layers meet. This is only to further strengthen the wall surface and to reduce the chance of sympathetic vibrations between the two sheets.

6. EXTERIOR WALLS

On exterior walls or ceilings with a vapour barrier, make certain that the seal remains in-tact (tuck-tape is a man's best friend there) and where plastic meets the back of the speaker driver, use some glass- or fiber-wool or a thin layer of dampening material between the two, extending up and down the cavity for at least 8" so the plastic does not become a gazoo when the speaker plays. Remember that you are working with vibrational technology, and you're not "loading" a driver, or creating a tuned back-box, you are building an infinite baffle.

7. SURFACE PREPARATION

Regardless of how careful we are, during the installation of the speaker there is always the chance of contamination or soiling of the speaker surface where dust and oil can deposit itself. Especially if there is any silicon used on the same premises, such as window or tub sealants. Silicon, oily deposits, wood- or drywall-dust can create adhesion problems for any surface to hold primer, paint or plaster.

In order to increase the adhesion properties of the speaker surface, we do suggest to prep the speaker surface by giving it a light sand-down and using a PVA. This is found as a primer, or in compounds such as woodglue, white glue etc. If no PVA primer is available, use a wash of slightly thinned-down regular white-glue, or carpenter's wood glue if white-glue is not available, brushed or rolled-on so that you have a prepped bonding surface. Do this after you put the speakers in the wall and after having tested them, and before applying drywall compound. It's dry in minutes, and negates any contaminants that might have deposited on either the gyprock or the speaker surface over time.

8. DOWN TO THE FINISHING LINE

To create a perfectly flat finished surface, here is the trick. With a sharp blade and steel ruler or guide, just score at an inward angle, at a distance of about ¾ to 1 inch around the edge of the drywall, and peel off the drywall paper around where the speaker goes, just down to the gypsum surface. Using a mall putty knife (blade square to the surface) or sanding block, gently draw it along the edges and chamfer the gypsum to meet the required depth to hide the tape and top coat, after which use a vacuum to get rid of any dust or chunks in and around the cavity. This creates a slight recess in which the first paper or gause tape will disappear.

9. CONNECTING THE SPEAKER

Using an appropriate crimp tool (do not attempt to use anything else) connect the speaker wires to the speaker leads, positive to RED, and negative to Blue. It is extremely important that speaker pairs are wired in the same manner, as a reversal of polarity will have impact on sound quality and spatial reproduction.

When using a backbox, place the speaker within the opening, on top of the rubber seal of the back box flanges, making sure the connecting cable cannot touch the back of the speaker, nor can rattle or vibrate within the back box. Often techs will use batting (as in fibrefill) or pink insulation between the cable speaker and back box to prevent any accidental vibration.

10. Mounting the Speaker Panel into the cavity

When using a backbox, use four Number 8 by 3/4 stainless steel round head metal or self tapping machine screws, and screw the speaker baffle through the mounting holes with the self-tapping screws into the speaker mounting flange of the back box, without fully tightening them, opposite corners at a time. (top left, bottom right, etc). **DO NOT USE FLATHEAD SCREWS** since drywall screws will not allow you to tighten the AIW panel tight enough before you run out of threat, and the screw will strip the metal flange of the backbox. Conventional drywall screws can be used only when mounting into the synthetic blocks, providing a much deeper grabbing surface.

11. Final depth adjustments before skimcoat is applied

All mounting surfaces are covered with a specific rubber surface, used as a spring surface to allow for depth adjustment. Using a hand-held screwdriver and a straight ruler or level, recess the speaker to the desired depth. Tighten each opposite corner until the speaker is completely flush with the edge of the drywall at the opening, providing sufficient space to apply the required drywall tape and skimcoats. If the Gypsum edge has been chamfered to a recess of $1/16^{th}$ (1.5mm), the speaker should be placed at the same depth.

12. **TEST THE SPEAKER FOR PROPER OPERATION**

Listen for problematic sounds, rubbing, resonances or rattling. Only once satisfied that the speaker functions properly, finish as per the finishing instructions below. (please note that the speaker will not sound properly equalized at this point, as the final, and most important part of the installation, the coupling of the speaker and surface finish has not been done yet.) Do not play the speakers again until the finishing surface has completely dried.

13. FINAL DRYWALL FINISH

If the gyprock surface is too dry, lightly moisten the adjoining gyprock area with a moist rag to increase adhesion with compounds. Next pre-mud the gaps with drywall compound (Durarock 90, 45 or equiv), making sure there is a good bond and a sufficient amount of backing between the speaker edge and the wall surface, stopping any possibility of edges causing unwanted noises, or insufficient support for in behind the drywall tape. Only then tape and smear the edges, making sure the tape remains tight and flat, and centered between the gypsum and speaker edge equally, and is bonded well.

Improper taping would result in loose edges and creates distortion. An even coat over the speaker surface and edges should be set within the hour. Do not feather the compound back to the paper speaker surface, but spread across evenly as the speaker response is designed to have a coat of $1/16^{th}$ to $3/32^{nd}$ compound on it. Just make the surface as even as possible without exerting excessive pressure on the speaker surface. Do not overwork the surface, nor leave large chunks of drywall compound as specifically chemically cured 45 or 20 minute compound is extremely hard, and difficult to sand after.

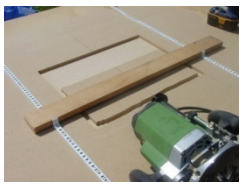
After drying, build-up the skim-coats as required, lightly sanding them in-between, to build-up a surface thickness of about 1/16 (1.5mm) to $3/32^{nd}$ (2 mm). Just use regular drywall compound, no special or lightweight compounds. Finish with final sanding and a primer and paint as if it were a regular drywall surface. When properly installed and covered, there should be no sign of the speaker, and although one can get extremely loud performance from our AIW5X series speakers, the wall will not resonate nor crack at the seams. Do not expose yourself to long periods of high SPL levels, as it can and will cause hearing damage over time.

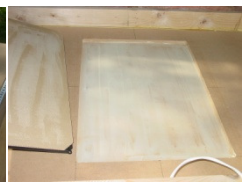
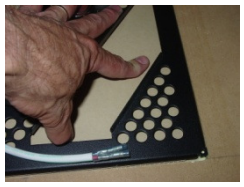
14. IMPORTANT NOTE:

Again, take notice that if there is not enough compound (min $1/16^{th}$ to about $3/32^{nd}$ of an inch), or the seams are not properly filled and/or taped, or the unit is not properly bandpassed and exposed to too much LF energy below the recommended filter settings, you will create a possibility of cracking around the perimeter. Equally, TOO MUCH plaster or compound is also unacceptable, as it will take away from the efficiency and frequency response, and will create a tendency to overcompensate the loss with more power. This does not happen if installed properly. Use appropriate drywall compounds and procedures only. All of these factors are part of the warranty conditions, and have to be adhered to for the AMINA in-wall Warranty to be in effect.

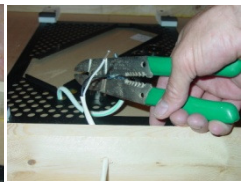
15. INSTALLATION IN WOOD VENEER PANELS OR FURNITURE

When installing the AIW in a solid surface, such as wood furniture or panels, using a CNC mill or router, remove access material down to about 1.5 to 2 mm. (see example below of hand-router install into MDF wallpanel)



Router out a cavity, leaving 1.5 to 2 mm material, remove any uneven surface using light sandblock, dryfit, and using appropriate glue for materials used, spread on both surfaces and press into place



Applying pressure, let dry thoroughly, and secure using the synthetic mounting blocks with glue and wood screws. Using proper tools, crimp wire connections.

Properly installed, the AIW speaker will propagate the vibrations through to the surface without any noticeable degradation of the sound quality. If the back is open to the room, it is strongly advised to create a backbox using using 1 ¼ " x 1/2 " strip frame glued around the perimeter of the back of the panel, place a sound blanket (fibreglass or acoustic absorbent material) on the back of the speaker and cover with a fitting back, leaving an exit for the connecting cable. This way the speaker is protected and does not radiate into the space behind it.

16. <u>APU-2 Protection filters and Warranty requirements</u>

All AIW speakers come with an APU-2 protection filter, which is to be calibrated to allow the maximum SPL for the unit it connects to with a current limiter and fitted with a 120Hz/ 20db/Octave Filter. This unit is to be installed actively in-line with every speaker, in order for the AMINA Warranty to be in effect. APU channel protection provide a stable impedance with a proper 8 ohm load (6.2Ω DCR) connected only. Do not follow this device with a variable load such as an serial potentiometer for volume control, as the high Z will interact with the filter-design and alter the function and reliability of the APU-2, voiding all warranties, implied or expressed by the manufacturer.

Note that all APU-2 filters supplied should be considered to be set-up to their highest output (J1) the setting for the AIW5X unless specifically marked, and one is certain that the setting has not been altered. So before connecting them, open the APU-2 units up by removing the four small screws in each corner using a #1 philips screwdriver, and set the jumpers J1-3 and J4-6 to the appropriate selection <u>FOR BOTH CHANNELS</u>. Failure to do so shall render the warranty on the speaker void.

Each Channel can be operated independently. This is handy if AIWX panels of different power ratings are being controlled by the same 2-channel APU-2. (I.E channel 1, AIW5X setting using J1, and for channel 2, for instance an AIW1X setting using J3, or any other combination.)

A single APU-2 is needed when using an AIW2X or AIW4X Dual input (stereo)versions. AIW2X and -4X were designed to acoustically maintain spatial information, or the “room” sound, which is otherwise lost when electronically combining a left/right signal in which out-of-phase information between channels is cancelled. This maintains the original performance characteristics and enhances the listening pleasure.

The AIW2X and AIW4X are capable of providing the same efficiency and SPL output as their single input counterparts (AIW3X and AIW5X respectively) when driven by a mono source equally on both channels. It is not recommended that these “stereo” units are wired from a single amp channel in parallel or series after the APU-2, as the impedance presented to the APU-2 will not be appropriate to the design of the device, and render it ineffective.

The APU-2 provides the factory required protection, and needs to be installed after the amplifier, be accessible, prior to the cables entering the wall. Remember, the APU-2 comes always preset to AIW-5 having the jumper installed at the J1 and J4 settings .

These are the appropriate settings for the AIW series speakers

AIW1X - J3/J6 (20W)
AIW2X - J3/J6 (20 W per channel x 2)
AIW3X - J2/J5 (40W)
AIW4X - J2/J5 (40W per channel x 2)
AIW5X - J1/J4 (80W)

Fig 1

Figure 1 shows the APU-2 set up for 2 x AIW3X or 1 x AIW4X using J2 and J5

After setting the APU-2, using a marker to indicate the settings on the front-label.

17. APU MULTI-CHANNEL UNITS

This June 2009 will also see the release of the first in a series of multi-channel Passive HPF/Protection circuits with capabilities of providing up to eight individually adjustable APU channels in a 1-U high, 19" rackmount unit. Further details of connections and technical specifications will be made available. Figure 2 and Fig 3 provides a front- and top-view of the APU-R 8-channel unit.

FIG 2

FIG 3

The APU 8 can replace up to 4 APU-2 units, providing the installer with a sleek and easy to install option for rack-mount applications. Further product slated to be released will afford the commercial contractor multi-channel solutions for larger installation, as well as 70/100V solutions.

We hope that these installation notes may come to good use for all that install our product.

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